

# HEREDITY AND DEVELOPMENT 9

Name \_\_\_\_\_  
Date \_\_\_\_\_  
Hour \_\_\_\_\_

For each of the following problems, work them using fractions and fill in the information on the indicated lines. Refer to the table on pages 134 of your textbook for a description of pea traits.

1.  $Nn \times Nn$

Genotypic ratio: \_\_\_\_\_

Phenotypic ratio: \_\_\_\_\_

2.  $Aa \times aa$

Genotypic ratio: \_\_\_\_\_

Phenotypic ratio: \_\_\_\_\_

3.  $Tt \times Tt$

Genotypic ratio: \_\_\_\_\_

Phenotypic ratio: \_\_\_\_\_

4. Cross two plants that are heterozygous for green pods.

Genotypic ratio: \_\_\_\_\_

Phenotypic ratio: \_\_\_\_\_

5. Cross a plant that is heterozygous for axial flowers with a plant that has terminal flowers.

Genotypic ratio: \_\_\_\_\_

Phenotypic ratio: \_\_\_\_\_

6. Cross a homozygous tall plant with a short plant.

Genotypic ratio: \_\_\_\_\_

Phenotypic ratio: \_\_\_\_\_

7. Cross a plant that is heterozygous for smooth pods with a plant that has constricted pods.

Genotypic ratio: \_\_\_\_\_

Phenotypic ratio: \_\_\_\_\_

8. When a tall plant is crossed with a short plant, some of the offspring are short. What are the genotypes of the parents and the offspring? What is the phenotypic ratio in the offspring?

Parent genotypes: \_\_\_\_\_

Offspring genotypes: \_\_\_\_\_

Phenotypic ratio: \_\_\_\_\_

9. Three-fourths ( $\frac{3}{4}$ ) of the plants produced by a cross between two unknown pea plants have axial flowers and  $\frac{1}{4}$  have terminal flowers. What are the genotypes of the parent plants?

Parent genotypes: \_\_\_\_\_

10. What cross would result in  $\frac{1}{2}$  of the offspring having green pods and  $\frac{1}{2}$  of the offspring having yellow pods?

Cross: \_\_\_\_\_

## SKILLS

### Writing Mathematical Ratios

The first table below gives the results of two of Mendel's monohybrid crosses. If you look only at the raw data, it is difficult to determine whether there is any relationship between the results of each cross. However, if the number of offspring with each contrasting trait is written as a mathematical ratio, then the results of the two crosses can be compared. Notice that for each of these monohybrid crosses, Mendel obtained the same approximate ratios.

CROSS	OFFSPRING	ACTUAL RATIO	APPROXIMATE RATIO
Long stems $\times$ long stems	787 long stems 277 short stems	2.84:1	3:1
Green pods $\times$ green pods	428 green pods 152 yellow pods	2.82:1	3:1

1. Complete the table below by writing the results of each cross in ratio form.

CROSS	OFFSPRING	ACTUAL RATIO	APPROXIMATE RATIO
Peas with axial flowers $\times$ peas with terminal flowers	651 axial flowers 207 terminal flowers		
Fruit flies, normal wings $\times$ fruit flies, curly wings	103 normal wings 92 curly wings		
Oval radishes $\times$ oval radishes	25 long radishes 52 oval radishes 28 round radishes		
Red-eyed, wingless fruit flies $\times$ sepia-eyed, winged fruit flies	89 red-eyed, winged 27 red-eyed, wingless 32 sepia-eyed, winged 10 sepia-eyed, wingless		

2. For each cross, use the ratios to determine the genotypes of the parent generation. \_\_\_\_\_

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# VOCABULARY REVIEW

Match each definition in Column A with a term in Column B. Some terms may be used more than once or not at all.

## Column A

## Column B

- |                                                                                                         |                               |
|---------------------------------------------------------------------------------------------------------|-------------------------------|
| _____ 1. Inheritance determined by the interaction of two or more pairs of genes                        | A. autosomes                  |
| _____ 2. The hypothesis that a gamete receives only one member of a pair of genes                       | B. dihybrid                   |
| _____ 3. The different forms of genes for a particular trait                                            | C. dominant                   |
| _____ 4. A gene that is not expressed                                                                   | D. phenotype                  |
| _____ 5. The passing of traits from parents to their young                                              | E. heterozygous               |
| _____ 6. An organism in which the two genes for a given trait are alike                                 | F. homozygous                 |
| _____ 7. The genetic makeup of an organism                                                              | G. heredity                   |
| _____ 8. Chromosomes other than the sex chromosomes                                                     | H. genotype                   |
| _____ 9. A chart that shows possible combinations of genes among offspring of a cross                   | I. genetics                   |
| _____ 10. A genetic cross that involves one pair of contrasting traits                                  | J. monohybrid                 |
| _____ 11. The outward appearance of an organism                                                         | K. polygenic                  |
| _____ 12. An organism in which the two genes for a given trait are different                            | L. self-pollination           |
| _____ 13. A genetic cross involving two different sets of traits                                        | M. principle of segregation   |
| _____ 14. A gene that prevents the expression of another gene                                           | N. Punnett square             |
| _____ 15. The branch of biology that deals with heredity                                                | O. recessive                  |
| _____ 16. Previous events do not affect the probability of later occurrences of the same event          | P. trait                      |
| _____ 17. The occurrence of a number of genes on the same chromosome                                    | Q. alleles                    |
| _____ 18. A group of organisms that produce young that have only one form of a trait in each generation | R. product rule               |
|                                                                                                         | S. incomplete dominance       |
|                                                                                                         | T. rule of independent events |
|                                                                                                         | U. factors                    |
|                                                                                                         | V. pure line                  |
|                                                                                                         | W. first filial generation    |
|                                                                                                         | X. linkage                    |